THE OIT TIMES

"Turning Industry Visions into Reality"

EXPO EDITION

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SPRING 1999

OIT's 3rd Industrial Energy Efficiency Expo draws 1100 to hear about, discuss the future of American Industry

INSIDE

New "compacts" signed with glass, steel industries

OIT's 3rd Industrial Energy Efficiency Symposium and Expo was held in Washington, DC on February 7-9, 1999 and was a notable success. This year's theme of "Discover Why 2020 Is Better than Hindsight" revolved around what American industry might look like in the year 2020. Nearly 1100 attendees from all over the U.S. came together to share ideas about how to improve energy efficiency and competitiveness and reduce waste. For the benefit of those who were unable to attend and to help document the event proceedings, we are devoting most of this issue of *The OIT Times* to reporting on Expo.

"The 'Industries of the Future' exemplifies the kind of collaborative approach essential to meeting challenges in the 21st century," said Vice President Al Gore in his message to all who attended Expo.

"One of the key ways our partners will be able to realize substantial cost savings and avoid pollution is by incorporating energy efficiency and renewable energy technologies that will be highlighted at this Conference," said Energy Secretary Bill Richardson in his message.

In her plenary session remarks, Deputy Assistant Secretary for Industrial Technologies Denise Swink helped set the stage by saying, "One of the great things about Expo is that it gives everyone such sweeping exposure to everything from down-to-earth practical ideas for improving everyday energy efficiency right now to futuristic breakthrough technologies with the potential to revolutionize entire industries."

Reicher's keynote praises IOFs

Dan Reicher, Expo's keynote speaker and DOE's Assistant Secretary for Energy Efficiency and Renewable Energy, described the nine energy-intensive and largely natural resource-based "Industries of the Future." He said, "They provide the foundation for the rest of American industry. Together, they supply over 90% of our economy's need for materials. Their total annual sales exceed $1 trillion, and they directly account for about 7% of our GDP. These industries also employ over 3 million, mostly high-wage workers. Simply put, the 'Industries of the Future' are essential to our economy and quality of life," he said.

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He went on to say that, "The 'Industries of the Future' has become a model for public-private partnerships." Reicher noted that "By leveraging OIT's funds with those of its industrial partners, we estimate industry will save up to 4.5 quads of energy by 2020. That's enough energy to run all industrial plants in Ohio, Pennsylvania, Michigan and West Virginia for a year. What's more, those energy savings would cut industry's energy costs by almost $16 billion–that's about 14% of what industry spends on energy today. In addition, reducing industry's use of fossil fuel would help cut emissions of CO_2 by an estimated 93 million tons per year in carbon equivalent," Reicher observed.

Cement industry may become IOF

In his speech, Reicher announced, "The nine industries may soon be joined by a tenth large, energy-using industry. The cement industry is now considering a commitment to the

(continued on page 16)

Aluminum

"Inert anode dialogue long overdue"

John Green of The Aluminum Association said there has been strong interest in the **Aluminum** industry's roadmap worldwide, and that aluminum manufacturers from Canada, Australia, South Africa and Europe had requested copies. He indicated that the success of the roadmapping process inspired the industry to undertake additional roadmaps in the two areas that it judged could make the most difference. On the supply side, the aluminum industry did an inert anode roadmap because of the potential for a new reduction cell to reduce costs, energy use and carbon emissions. On the use side, it did an auto market roadmap as this was seen as the area with the biggest potential for demand growth.... Subodh Das of ARCO commented briefly on what he saw as the biggest accomplishment of the aluminum roadmapping process. "It stimulated all the major companies to get together for the first time and talk seriously about what's required to develop a new inert anode—an inquiry that is long overdue," he said.... Greg Barthold of the American Society of Mechanical Engineers described the aluminum inert anode study he is coordinating. The study is investigating past R&D of relevance to inert anodes and the current state of the art. Barthold expects also to identify potential avenues for future R&D in the area. Barthold said there are a number of critical issues concerning inert anodes that go beyond successful development of the technology. These include:

- Is it more efficient to burn carbon in the cell or at the power plant?
- What are the potential impurity levels from inert anode erosion?
- New cell design vs. cell retrofit—would a new design mean that manufacturers would have to "gut their potrooms"?....

Lisa Barnett, OIT's **NICE**^{3} program manager, described how her program and OIT's **Inventions and Innovation** program are assisting the aluminum industry. She identified several successful demonstration projects that her program has supported for the aluminum industry including (1) recycling of aluminum wheels ground into chips, (2) the aluminum scrap decoater process, and (3) recycling of aluminum dross and saltcake. She also identified aluminum roofing materials fabricated out of chips with superior solar reflecting capability as an I&I program success…. Debbie Haught, OIT's **Continuous Fiber Ceramic Composites** program manager, discussed a successful project employing ceramic immersion tubes in an aluminum casting furnace. Developed by Textron, the new tubes were in continuous operation for 1750 hours, and endured 41 heats of aluminum. They have helped reduce cold start cycle from three days to two, and demonstrated improved heat transfer efficiency and thermal shock resistance over conventional tubes. (Contact: Sara Dillich, 202-586-7925)

Paul Wilhelm and Andy Sharkey (AISI), Dan Reicher (DOE), Thomas Danjczek and Robert Ackerman (SMA) with new steel industry compact.

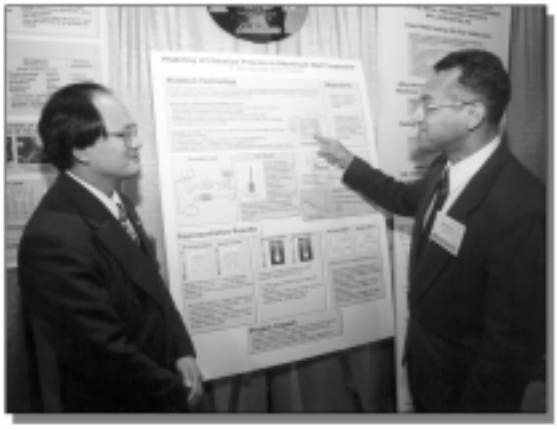
Steel

Sen. Byrd honored; calls IOF "government at its best"

The **Steel** Industry opened its session, moderated by Tony Martocci of Bethlehem Steel, by honoring Sen. Robert Byrd from West Virginia for his long-term commitment to the industry. Byrd said "There are basic industries that a vigilant government does not neglect. Steel is such an industry." Commenting on OIT's innovative support of basic industries, Byrd said, "The Industries of the Future program is government at its best."... Lawrence Kavanagh of the American Iron and Steel Institute said of the partnership between OIT and the steel industry "It is of great benefit to us for OIT to align its R&D resources with our goals." He also noted that there were 16 projects underway targeting high priority industry needs, and he invited potential R&D partners to submit proposals for the next solicitation.... The National Insulation Association presented Bethlehem Steel's Burns

Metalcasting
New projects, partnering opportunities discussed

Raymond Monroe of the Cast Metals Coalition moderated the Metalcasting Team's first session.... Diran Apelian from Worcester Polytechnic Institute described his nationally recognized work on studies of the microstructure of aluminum alloys to optimize performance during aluminum die casting.... Charles Bates from the Univ. of Alabama at Birmingham provided details on his work in the areas of steel machinability, clean cast steel technologies and lost foam technologies. In the latter program, UAB has been instrumental in "Moving lost foam from a witchcraft process to one generating real excitement," he said.... The third speaker, Allen Miller from Ohio State Univ., described his efforts in gaining a better understanding of diecasting die deflection and part distortion to help reduce scrap rates.... The second session presented a portfolio of opportunities for the metalcasting industry and its suppliers available from OIT programs. For example, R&D in OIT's **Combustion** program is demonstrating that oxygen enhanced combustion technologies offer great productivity and energy efficiency benefits for metalcasters in furnaces and cupolas, driven by greater flexibility in flame size and shape.... A demonstration project in OIT's **Distributed Generation** program is testing single crystal investment casting of hot section parts for use in advanced turbine systems.... OIT's **Industrial Assessment Center** audits of metalcasting plants often identify opportunities relating to furnace setbacks, induction heating, automating operations, solvent recovery operations and finishing room tasks. A computerized assessment database is also available.... The **Advanced Industrial Materials** program is helping to develop castable and moldable intermetallic alloys. It also provides industry researchers with free access to the state-of-the-art Metals Processing Laboratory User Facility at Oak Ridge National Lab. Recent studies undertaken there have addressed thermal conductivity of ceramic coatings and lost foam casting.... The first **Sensors and Controls** solicitation awarded funds to a project titled "Sensing and Intelligent Control of the Cupola Furnace." (Contact: Harvey Wong, 202-586-9235)



OIT's Harvey Wong and Makhlouf Makhlouf (Worcester Polytechnic Institute) discuss metalcasting industry's future.

Harbor plant with its "Insulation Energy Savings Award" for the plant's innovative use of insulation on a steam unit, an effort supported by OIT's Steel Team and **Steam Challenge** program.... Dr. Richard Fruehan of Carnegie Mellon Univ. discussed the impact of new technologies on energy efficiency in the steel industry. He noted that the industry has an outstanding track record in reducing energy use by 43%, driven by scrap recycling and continuous casting technologies.... Bill Heenan of the Steel Recycling Institute emphasized the industry's energy efficiency successes in recycling. He said that steel is the most recycled material in the U.S., and the automobile—a key end-product—is the most recyclable product.... Dr. Gordon Forward of Chaparral Steel identified several potential areas for emissions reduction in the industry. He suggested increased use of steel slag instead of limestone in cement kilns as a way of turning one industry's "waste" into another industry's "feedstock." Widespread use of this process could reduce carbon dioxide emissions by nine million tons annually, he said. (Contact: Scott Richlen, 202-586-2078)

Senator Byrd and AISI's Andy Sharkey with Ultra Light Steel Auto Body.

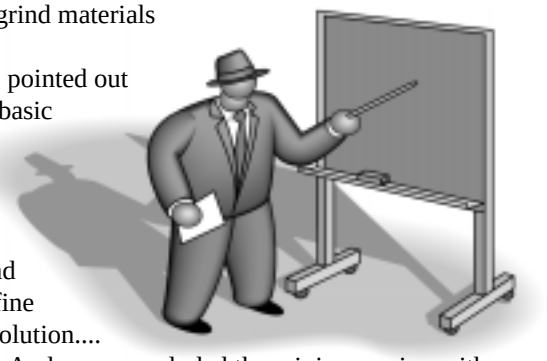
Mining
Industry begins setting R&D priorities

The **Mining** panel included three speakers who addressed various aspects of the mining industry's technology roadmapping effort. Larry Stolarczyk of Raton Technology Research covered mineral exploration and characterization. He emphasized the need for improved methods of remote sensing to provide mine developers and operators with better information about ore bodies.... Jim McWilliams of American Electric Power outlined a number of barriers to safe and efficient mining in the U.S. He then listed several mining industry R&D priorities, including the need to develop:

- Autonomous mining equipment
- More efficient technologies for removing rock, ore and coal
- More efficient in-situ extraction and near face beneficiation
- Integrated safety equipment for respiration, ear and eye protection
- Improved ground control techniques for difficult surface and underground mines
- An integrated information system for mine-wide communication

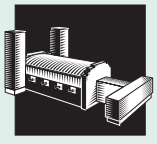
McWilliams then described opportunities for improving the efficiency of mining industry **Motor Systems** which account for 90% of the industry's electricity usage. Topping his list of areas for potential improvement were (1) fan systems for underground mine ventilation, (2) pumping systems for de-watering and slurry pumping, and (3) compressed air systems for air-driven mining equipment and tools.... Bob Johnson of Phelps Dodge Corp. followed with a parallel discussion about mineral processing R&D priorities, including the need to develop improved:

- Materials for wear and construction
- Sensors for process stream characterization and control
- Techniques for small, low-grade, remote ore bodies
- Dewatering technologies
- Ways to grind materials



Johnson also pointed out the need for basic research on mineral properties, solution properties and behavior of fine particles in solution.... OIT's Arlene Anderson concluded the mining session with a useful talk describing numerous available resources that may be of interest or use to the mining industry in other DOE offices, the National lab system, and other Federal agencies and programs. She also described OIT's emerging work with various State-level IOF initiatives. (Contact: Toni Grobstein Marechaux, 202-586-8501)

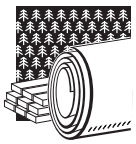
Glass
Innovation is the name of the game



Six speakers representing different sectors of the industry summarized the latest technologies and developments affecting U.S. glass manufacturers. Michael Greenman, interim director of the Glass Manufacturers Industry Council (GMIC), highlighted start-up activities of the GMIC. He explained the many benefits of membership, including facilitated access to the National Labs, a strong voice in R&D direction, and early access to R&D results.... Gary Toth of PPG Industries identified trends, future directions, and technology hurdles for melting, forming, and product development in the fiberglass industry. In the product area, for example, there will be a need to produce finer filaments for electronics and coarser filaments for structural purposes. Fiberglass manufacturers will need in-situ sensor systems that relate strand structure to product quality and performance.... Vince Henry of Visteon reviewed challenges, opportunities, and recent innovations in the flat glass industry. He noted that one of the biggest challenges for automotive glassmakers is to develop spectrally selective coatings that can reduce the heat load in vehicles using less-effective freon-substitute refrigerants.... Joseph Cattaneo of the Glass Packaging Institute reported that while the container glass industry has undergone significant consolidation since 1983, it has learned to make bottles lighter and stronger. The industry is projected to increase sales by 1.5% annually through 2002. Much of the anticipated growth is tied to the flourishing microbrewery industry.... Fred Quan of Corning Inc. emphasized the importance of new ideas and new product development for the

Forest Products

Numerous energy efficiency efforts examined



David Cooper, a consultant for the American Forest & Paper Association, moderated the **Forest Products** session. Cooper discussed the status of the Agenda 2020 effort, noting that the forest products community submitted a record number of quality proposals in 1998. The program also received significant funding from agencies other than DOE.... Gary Baum of the Institute of Paper Science and Technology provided an update on university involvement in Agenda 2020, including the formation of the Pulp and Paper Education and Research Alliance, current funding levels, and new activities for the universities.... Del Raymond of Weyerhaeuser discussed the forest products industry's Gasification Initiative. Raymond explained that new gasification technologies will enable the industry to become an energy seller rather than a net energy buyer. However, before installing these technologies, they will need to be demonstrated. This will require cost-sharing partnerships.... Barry Erickson of Gould Pumps discussed how industry is trying to minimize energy use to improve processes. Erickson used pumping applications as an example. He explained how implementing technologies like variable frequency drives can make pumping processes more efficient.... Bill Stafford of The Association of the Pulp and Paper Industry discussed TAPPI/DOE cooperative efforts. These include Agenda 2020 and promotion of **Motor Challenge** management activities like short courses and distribution of MotorMaster software. TAPPI's next step will be best practice case studies.... Chris Bigalke of Chemstone Inc. described the success of a **NICE^3** technology demonstration project, "Chemicals for Increasing Wood Pulp Yield." Chemstone is demonstrating a newly-developed patented chemistry that results in better fiber breakdown, higher pulp yields, and cleaner pulp when added to the pulping process.... Jeff Sasko, President of Dieter-Bryce Corp., discussed a successful **Inventions and Innovation** project titled, "Cradle Debarker." This technology, which takes bark off trees, is much more energy efficient than standard debarkers. Sasko credits much of his business success to the training he received from the I&I program.... Bruce Tatarchuk, of Auburn Univ., described an on-site ClO_2 generation project that will provide U.S. mills with an efficient and cost-effective method for producing ClO_2. The industry has turned to ClO_2 as an alternative to elemental chlorine in bleaching operations, since chlorine is hazardous to the environment.... And, Bob Meglen, of the National Renewable Energy Lab, spoke about his project, "Feedstock to Product Characterization Tools for the Wood and Pulp Industry." Meglen's project uses an infra-red light to chemically analyze wood chips in real-time. His plan is to use this technology on trees before they are harvested. (Contact: Valri Robinson, 202-586-0937)

specialty glass industry. He described some of the exciting new or emerging products and applications at Corning, including dental implants, large astronomical mirrors, and large effective area fibers (LEAF) for telecommunications.... Finally, Alex Marker of Schott Glass Technologies described how his company is developing a whole new melting and production process to support fusion energy research at one of the national labs. The process will produce high-optical-quality phosphate laser glass (in sizes twice those previously manufactured) in large volumes.... A highlight for the glass industry's participation in Expo was its compact signing with DOE. See the page 1 feature story. (Contact: Theo Johnson, 202-586-6937)

DOE's Dan Reicher and Visteon's Vince Henry ink new glass industry compact.

Agriculture

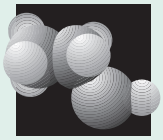
Agriculture prepares for the new millennium

James McLaren, Chair of the Renewables Vision 2020 Executive Steering Group, recapped the progress that the bio-based renewable resources industry has achieved to date in setting aggressive goals for the future. He suggested that the next-generation roadmap should match technology to consumer needs and look at the supporting infrastructure, handling, and processing of bio-based renewable resources and products in an integrated manner.... Paul Wang explained how OIT's **Sensors and Controls** program will support the bio-based renewable resources industry by incorporating priority industry needs into its program plan and conducting solicitations for the needed research in coordination with the OIT **Agriculture** Team.... Rebecca DiCola from GE reported on a successful industry-government collaboration to synthesize a plastic monomer from corn. Development time was cut in half as a result of OIT's critical bridge funding to GE, Henckel, and Purdue Univ. for development of the bioprocess and biocatalyst. "Chemistry could go no further in reducing production costs for this plastic, but biology delivered," she said.... Dr. Robert Armstrong of USDA's Alternative Agricultural Research and Commercialization Corp. shared his reasons for believing the economy of the 21st century will be bio-based. He briefly summarized his agency's role in helping small, mostly rural businesses launch new bio-based products.... Dr. Robert Beachy, head of the new Danforth Plant Science Center in St. Louis, presented his analysis of what the bio-based renewables industry needs to move ahead and begin delivering on the promise of its vision. The most crucial needs are for more monetary and technical resources; a climate that encourages innovation, interdisciplinary research, and cross-specialization; and ways to attract the best and brightest minds to the field.... Also at Expo, "The Technology Roadmap for Plant/Crop-based Renewable Resources 2020" was released. (Contact: Doug Faulkner, 202-586-2119)

OIT's Denise Swink welcomes everyone to Expo.

Chemicals

Roadmaps, projects, new solicitation highlighted



Robin Rogers, Professor of Chemistry at the Univ. of Alabama, discussed the status of the Technology Vision 2020 process. Rogers highlighted the results from roadmapping workshops. He said that a roadmap covering alterative media, reaction conditions, and raw materials will be published in early spring.... Tyler Thompson of Dow Chemical described the Multi-Phase Fluid Dynamics Research Consortium, which is composed of 21 organizations. Thompson discussed the history of the coalition, as well as funding sources and technology transfer opportunities.... Dow Chemical's Richard Varjian discussed the project, "New Electrochemical Reactor to Reduce Energy Consumption in the Production of Chlor-Alkali." The proposed new electrochemical reactor would reduce the cell power consumed by the chlor-alkali industry per unit weight of chlorine or caustic product.... Amy Manheim of OIT's **Chemical** Team provided information on the chemical industry solicitation, which is still being formulated. DOE expects to issue the solicitation in April, 1999. Awards are anticipated in December, 1999.... And Earl Beaver of Monsanto presented "A No-Nonsense Look at Tomorrow." He described some tools for sustainable development, including total cost assessments, efficient life cycle tools and visions. He also described the chemical industry steering team—its purpose, composition and processes. (Contact: Hank Kenchington, 202-586-1878)

Petroleum
Envisioning the future

John Stitzell chaired this session exploring the **Petroleum** industry's progress as an "Industry of the Future".... Jim Simnick of BP Amoco reviewed the industry's key drivers and challenges to underscore the advantages of collaboration on pre-competitive research. He identified needed research in materials, biological processes, refining technology including bioprocessing, the environment, information systems, analysis, and product supply. Progress in these areas can be measured against performance targets set forth in the industry's recently developed vision document. Work on the petroleum roadmap will begin in late March or April... .Jerry Moffitt of Chevron related his company's experience in working with a utility-sponsored energy efficiency program. Chevron implemented recommendations emerging from a no-cost audit at their Richmond (CA) refinery and has realized $700,000 annually in plant electricity savings. Jerry's motto: "If you go look, you will find something".... Bruce Krewinghaus of Equilon reviewed examples of past efforts in which the petroleum industry has worked successfully with DOE or the national labs. He then identified several environmental issues facing the industry that would be appropriate for a collaborative approach.... Hamid Abbasi of IGT and Tom Tillman of Detroit Stoker updated participants on a joint effort funded by OIT, IGT, and GRI to develop a new, forced internal recirculation (FIR) burner that produces sub 9 ppm NOx emissions. In 5,000 hours of operation on a standard watertube boiler, the new burner met NOx targets with no loss in efficiency or other detrimental effects. The burner, which will be modified for firetube boilers and radiant tubes, has broad application to large industrial boiler installations in a number of industries.... Manny Natarajan of Marathon-Ashland Petroleum delivered a status report on a collaborative project for bio-desulfurization of petroleum streams. The project seeks to isolate desulfurizing bacteria for sulfur reduction in FCC naphtha gasoline, which is responsible for 30-40% of the sulfur in the average gasoline pool. (Contact: Gideon Varga, 202-586-0082)

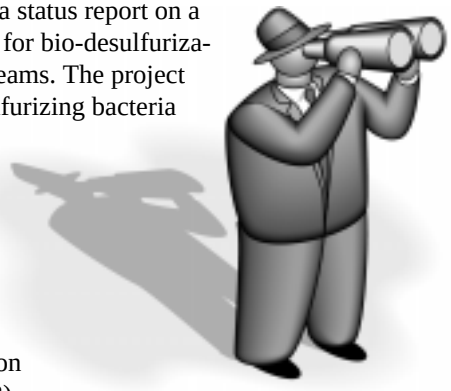


Exhibit Hall
Partners on all sides

Visitors to both levels of Expo's Exhibit Hall encountered an impressive array of attractive booths. Informative, colorful displays summed up many of the exciting projects to which companies, universities, state governments, other Federal agencies, and national labs are contributing their talents and resources. Among the exhibits that immediately captured attention were the one-third scale model of the Mercury 50—an advanced gas turbine by Solar Turbines—and the UltraLight Steel Auto Body displayed by the ULSAB Consortium.

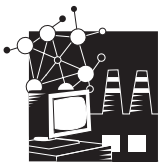
Richard Brent and Jeff Price (Solar Turbines) and OIT's Pat Hoffman discuss Mercury 50 turbine.

Tom Borton, standing at his booth for the Michigan Industries of the Future Program, noted the energy and enthusiasm of exhibitors and visitors alike. "Industries of the Future is really catching on," he said. "It's gathering momentum as more and more organizations join in." Indeed, the atmosphere of the Hall seemed charged by the synergy of diverse talents brought to bear on solving common problems. Many of the booths represented relatively new organizations, such as the Glass Manufacturing Industry Council and the Computational Fluid Dynamics Consortium, which evolved from recognition of common needs highlighted through the "Industries of the Future" process.

Distributed Generation/CHP
"Public policy is ten years behind the technology"

A diverse panel of power industry experts–including Susan Horgan of Distributed Utility Associates, Richard Brent of Solar Turbines, Brent Alderfer of the Colorado Public Utilities Commission, Al Forte of American Home Products and Neil Elliot of the Combined Heat and Power Assoc.–discussed the current and future states of **Distributed Generation** in industry. They noted that power reliability concerns–such as outages caused by earthquakes and ice storms–are causing more and more companies to consider generating their own power "outside the grid." New technologies, such as advanced turbine systems, and those featuring combined heat and power are allowing companies to boost reliability while reducing operating costs and emissions. The panel noted, however, that "public policy is ten years behind the technology," frustrating many companies that would benefit from distributed generation. The recently created Combined Heat and Power Assoc. will coordinate the first concentrated national effort to give a voice to proponents of distributed generation technologies. OIT's **Combined Heat & Power Challenge** is working with CHPA to inform industry and lawmakers about available CHP technologies and their potential benefits. (Contact: Pat Hoffman, 202-586-6074)

Materials
Experts discuss materials trends, roadmapping activities




The materials session included five speakers from a variety of materials areas. Homi Bhedwar, of DuPont, discussed the status of the Materials Technology Roadmap, part of the Chemical IOF effort. Bhedwar said the roadmap includes a prioritized list of technology needs, and near-, mid- and long-term strategies for addressing those needs. He also discussed the path forward, which involves soliciting proposals for projects that fit criteria established in the roadmap.... Robert Cleereman, Dow Chemical, discussed how we are not taking advantage of the full functionality of plastics. Instead of substituting plastics where possible, designers need to design products with the material in mind. This often requires changing the design specifications and manufacturing processes.... Richard French, of the American Welding Society, discussed the progress of the Welding Industry Vision. Priority needs include process and structural modeling, real-time process controls, automated welding, welding high-strength steels, and laser processing. The Welding Industry Vision will be published in Spring 1999. A roadmapping conference will also take place in the Spring and the roadmap will be published in Fall 1999.... Dale Obeshaw, of Delphi Automotive, spoke about next generation vehicles. He explained how the Kyoto conference prompted calls for new government fuel efficiency standards for automobiles. The challenge will be producing cars that meet these goals and also sell well overseas. Obeshaw is researching composites that are lighter than standard materials like steel. Besides using new materials, car makers also need new design strategies. His team is using computer programs to design parts with minimum weight and maximum stiffness.... Bill Long, who works with OIT's **CFCC** program, discussed applications of advanced ceramics. Ceramics such as silicon carbide and silicon nitride provide strength, toughness and reliability. Designers have started including these materials in applications like bearings, ball valves, thread guides, cutting tools and seal surfaces. (Contact: Charlie Sorrell: 202-586-1514)

Combustion
Cleaner combustion in your future

Chuck Benson of Arthur D. Little chaired this informative session.... In discussing the merits of High-Performance Combustion Systems, John Newby of North American Manufacturing showed that regenerative burners offer distinct advantages over recuperative burners in terms of energy efficiency and reduced emissions. Similarly, radiant tube burners significantly extend tube life and improve productivity.... Roberto Ruiz of John Zink Co. reviewed **Combustion** in the chemical and petrochemical industries, explaining the complex issues and tradeoffs involved in optimizing combustion efficiency while reducing emissions and satisfying other design criteria.... Doug Perks of Eclipse, Inc, speaking on behalf of the Industrial Heating Equipment Assoc., shared his enthusiasm over OIT's new **Process Heating Challenge** program and outlined ways in which the program can help manufacturers optimize operation of their (non-steam) process heating equipment.... John Marion of ABB Combustion Engineering showed how manufacturers' demands for low-cost, low-emissions boilers with fuel flexibility and high reliability are driving boiler designs for the future. As options multiply under deregulation, he foresees continued emphasis on pollution prevention and increased industrial focus on process or product economics in technology selection. (Contact: Gideon Varga, 202-586-0082)

Sensors and Controls
Helping smart sensors communicate

William Rippey of NIST explained how the relatively new standard IEEE 1451.2 represents a key milestone in the development of smart **Sensors** and actuators. The standard establishes a common interface between transducers (sensors and actuators) and microprocessors, thus solving a number of existing compatibility problems for users and market problems for transducer manufacturers. The standard enables self-identification of smart sensors, opening the way for true "plug and play" with different networks.... Nat Frampton of Real Time Development Corp. explored the trend toward MicroSoft CE-based control solutions and the likely implications for control architecture and requirements for sensor integration. Restructuring of support costs may require careful attention when conducting cost comparisons. (Contact: Eric Lightner, 202-586-8130)

Expo Industry Awards

- Subodh Das, ARCO Aluminum Co.
- Bob Mustell, National Corn Growers Assoc.
- Jim McLaren, Inverizon
- Phil Ross, Glass Industry Consultant
- Earl Beaver, Monsanto Co.
- Tyler B. Thompson, The Dow Chemical Co.
- Francis Via, Akzo-Nobel
- Douglas C. Yearley, Phelps Dodge Corp.
- Glen A. Barton, Caterpillar, Inc.
- Robert R. Meglen, Nat'l. Renewable Energy Lab
- Bruce Tatarchuk, Auburn Univ.
- John Stizell, Amoco (retired), Consultant
- Mike Lubcyik, Chevron
- Art Mares, Chevron
- Jerry Moffitt, Chevron
- John Browne, BP Amoco
- Dwight Barnhard, Superior Aluminum Castings, Inc.
- Paul Kennedy, Kennedy Die Casting, Inc.
- Vinod Sikka, Oak Ridge National Lab
- Jim Keiser, Oak Ridge National Lab
- Peter Gorog, Weyerhaeuser Co.
- W. B. A. Sharp, Westvaco
- Ronald Wallis, Wyman-Gordon
- Robert Gaster, John Deere
- Peter Carroll, Solar Turbines, Inc.
- Thomas Casten, Trigen Energy Corp.
- Ken Mentzer, North American Insulation Mfrs. Assoc.
- Glenn Hahn, Spirax Sarco
- Tom Henry, Armstrong International
- Gene Viola, Swagelok
- Bob Bessett, Council of Industrial Boiler Owners
- Ted Jones, Alliance to Save Energy
- Ed McMurrow, Air Power of Nebraska
- Tom Mays, Cochrane Compressor
- Joseph Ghislain, Ford Motor Land Services
- Bruce Medaris, Assoc. for Facilities Engineering
- Richard Labrecque, ITT Fluid Technology
- Gunnar Hovstadius, ITT Fluid Technology
- William Beekman, Floway Pumps
- Robert Ayers, Sulzer-Bingham Pumps
- John Zentner, Colorado State Univ.
- Derek Hengeveld, South Dakota State Univ.
- Klaus-Dieter E. Pawlik , Univ. of Florida
- Laura M. Bucanan, Univ. of Tennessee

Expo Congressional Awards

Member	Nominating Organization
Senator Christopher "Kit" Bond, R-MO	"Renewables Vision 2020" Executive Steering Group
Senator Slade Gorton, R-WA	United States Advanced Ceramic Association
Senator Ted Kennedy, D-MA	Cast Metals Coalition
Senator John D. Rockefeller, D-WV	American Iron and Steel Institute
U.S. Representative George R. Nethercutt, Jr., R-WA	"Renewables Vision 2020" Executive Steering Group National Mining Association
U.S. Representative Ron Packard, R-CA	Solar Turbines
U.S. Representative Ralph Regula, R-OH	USCHPA, Solar Turbines
U.S. Representative Zach Wamp, R-TN	Gas Turbine Association

National Mining Assoc.'s Richard Lawson presents award to Congressman George Nethercutt.

Automobiles
Auto materials in the 3rd millennium assessed

Andy Sherman of Ford, Jim Quinn of GM and Joe Carpenter of DOE presented their views about **Automotive** materials in the next millennium. They characterized the auto industry as one always interested in materials innovations. But, they noted, new materials concepts must meet strict criteria–they must be plentiful, readily available, affordable, manufacturable in high volume at low cost, require low cost tooling and allow the industry to maintain at least current levels of materials recyclability. They praised the steel industry for its development of new high strength steels, and for innovations such as the UltraLight Steel Auto Body. Such innovations are needed in order to meet future industry goals including a 20-40% reduction in mass, 20% reduction in aerodynamic drag and 30% reduction in rolling resistance. To meet these goals, materials R&D needs to focus on driving down costs and learning more about forming, casting, molding, and joining techniques of materials such as aluminum, polymer composites, magnesium, metal matrix composites and titanium.

Aerospace
Ozone depleting compound phase-out explained

Joe Syslo of the Aerospace Industries Assoc., Bob Schafrik and Srinivas Bagepalli of GE, and Darrel Staley of Boeing presented case studies of how they and other members of the **Aerospace** industry successfully phased out ozone depleting compounds (ODCs) from their operations—a mammoth task considering the ubiquity of these solvents throughout the industry's manufacturing and maintenance operations. Compounding the problem were often differing and complex local, state, Federal and international environmental requirements. Boeing participated in a multi-company, multi-industry pre-competitive effort to find substitutes for these substances as used in aircraft manufacture. GE took a TQM approach to eliminating the solvents from its metal cleaning and precision cleaning operations by analyzing soils, materials and every detail of each task. GE eliminated redundant and non-value-added operations and screened different alternatives for each cleaning task. The end result was a complete phaseout of ODCs and savings of more than $1 million annually.

Containers
Industry learning to "trade materials for information"

Paul Rankin of the Reusable Industrial Packaging Association summarized his recently released report analyzing the life cycles of single- and multi-trip 55-gallon steel drums. Such **Containers** are routinely used in transporting a wide variety of liquid products such as petroleum or chemical products or waste materials. His study showed that multi-trip drums are at least 3 times as energy efficient as single-trip drums and demonstrate similar savings in solid waste, air emissions and liquid effluents. Also, net economic costs to users of multi-trip drum systems are generally lower than for users of single-trip drum systems, said Rankin.... Mike Miller of Menasha Corp. gave a presentation on work his firm is doing with Paccar, a heavy truck manufacturer whose subsidiaries include Peterbilt and Kenworth. His company is examining the use of returnable (as opposed to one-way, disposable) containers in its heavy truck fleet. He discussed many variables that need to be considered in implementing returnable containers, including own vs. lease, standard sizes vs. custom sizes, types, customer service and so on. Ultimately, successful switching to less materials-intensive returnable containers requires a sophisticated materials logistic management system, i.e. trading materials for information.... Dave Guernsey of United Parcel Service (UPS) and Elizabeth Sturkin of the Alliance for Environmental Innovation discussed a joint project to implement reusable express mail packaging. UPS has begun trial usage of the following in certain of its express packages:

- An express box with post-consumer content increased from 46% to 78%,
- A one-time reusable express letter with post-consumer content raised from 73% to 80%,
- A plastic package with post-consumer content increased from zero to 15%, and
- A zero bleach package.

In addition to reducing the use of materials and generation of waste and pollutants, Guernsey claimed that the new packages have found a new marketing niche (the reusable express letter), enhanced his firm's corporate image and saved UPS $1 million.

Information Technology
E-business opportunities outlined

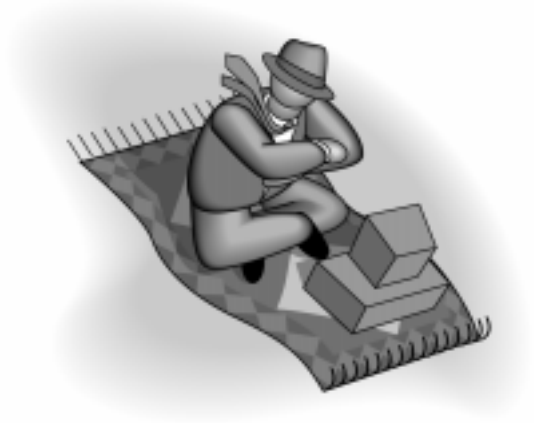
Manny Murillo, Director at Scient Corporation, discussed electronic data interchange (EDI)— industry's current e-business approach. Murillo explained how business on the Internet is booming, especially in retail businesses. Business-to-business activity is not as intense, but the opportunities are immense. The challenge is to be innovative. Murillo also discussed some technical issues related to Internet business, like network complexity, operational costs, on-going support requirements and limited trading partner base. The technology industry's vision is full-Internet EDI, which will open up opportunities by enabling more vendor-supplier links.... Steve Ariana, Managing Director of Scient Corporation, discussed "What Every CEO/CIO Needs to Know to Succeed in E-business." He described e-business as creating relationships over an economic medium to get economic results. Ariana noted that one day e-business will be the normal way to do business. According to Ariana, to participate in e-business, CEOs need the courage to innovate, a strong CIO and a new IT infrastructure. Further, organizations must be adaptive rather than predictive. CIOs should acquire expertise, understand that there is no such thing as downtime, and possess the courage to innovate. To participate, organizations should define an e-business strategy, assess readiness, identify targets, put together a net-centric and savvy team, and select the best technologies without spending too much time on analysis. The entire process should take about six months. Ariana concluded by saying, "Keep in mind that you're never done."

Construction
Industry's future appraised

Henry Michel, Chairman Emeritus of Parsons Brinkeroff, Inc., opened the session with a discussion of **Construction** trends and projections for the future. Michel stressed that the construction industry is an important customer of the nine "Industries of the Future," not to mention an important U.S. industry. He explained that the U.S. share of the global construction market is decreasing and, to compete globally, the U.S. will need to be innovative. He advocated collaborative R&D and improved exchange of knowledge among industries, which will help accelerate technology commercialization.... Ralph Johnson, Sr. Vice President at The Turner Corp., discussed demands on construction firms, including shorter delivery times, job site safety and worker training. Johnson also described industry challenges, such as a worker shortage, regulations that don't always make sense, and trouble marketing overseas due to taxes and regulations. He discussed how R&D is high-risk and low payoff for the industry. He also asserted that the industry will need to participate in R&D collaborations to share this risk.... Michael Dickens, CEO of IBACOS, Inc., discussed "the better home," a project involving an alliance of manufacturers called Build America. This project takes a new approach to design and construction of homes. Dickens also discussed trends that are affecting the residential construction market, including the aging population, the dual-income family, and restrictions on suburban sprawl. Dickens described the "house of the future" which will incorporate innovative technology, energy efficiency, and environmental benefits.

Communications
Speed, security, accessibility

John Summers of GTE Internetworking presented a strong case for considering a virtual private network (VPN) to meet all corporate inter-networking needs and safeguarding sensitive information. VPNs have the "look and feel" of a private network, yet run over the Internet. They allow remote, controlled access from anywhere in the world, facilitating selected data sharing with business partners, suppliers, and customers. Although transparent to the user, all data are encrypted, and access is authenticated using digital certificates. A major advantage over frame relays is the ease with which VPNs can be scaled up as the business grows.



Several new OIT publications, other communications items unveiled at Expo

If you attended this year's Expo, you probably visited OIT's literature display just outside the exhibit hall. The display contained more than three hundred different communications items, including brochures, fact sheets, catalogs, reports, CD-ROMs and videos—all available to OIT customers at no cost. The sheer number of available materials was enough to catch the eye, but the material's "family look" also caused the display to stand out.

For the last two years, OIT has worked to bring more uniformity to its printed materials that cover more than 20 industries and program areas. "Industry of the Future" team brochures, fact sheets and reports now share a common "family" design and format with materials for each team distinguished by a unique icon and color. The new "family look" should help customers find the information they need as quickly as possible.

As a service to our readers, we've highlighted below a few of OIT's newest publications that were featured at Expo. **You can request copies of all the publications and other items described below by contacting OIT's Resource Center at (202) 586-2090.**

OIT Brochure

OIT's new brochure is an informative publication for individuals who want to learn what OIT is all about. It describes OIT's "Industries of the Future" strategy, explains how OIT supports these industries, and introduces OIT's technology portfolio for each industry. The brochure is organized into eight sections, including:

- Industries of the Future
- Industry Visions
- Roadmaps
- Competitive Solicitations
- Resource Leveraging
- Crosscutting Technology and Assistance Programs
- IOF Portfolio Highlights & Technology Showcases
- Benefits

Team and Program Brochures

OIT's industry teams, and several additional programs have developed their own eight-page brochures. Each industry brochure describes the development and content of the industry's vision and roadmap(s), the "Industries of the Future" process, portfolio highlights, resources, and how to get involved. The sections describing portfolio highlights and resources incorporate information on OIT's crosscutting programs, which include technical and financial assistance programs, enabling technologies (like materials, combustion, CFCC, and sensors and controls), and distributed generation programs. Each brochure contains photos and diagrams, which enable the reader to better understand the processes and concepts presented.

Fact Sheets

OIT has developed new fact sheets that cover most of its current portfolio, including "Industries of the Future," technical and financial assistance, enabling technologies and distributed generation. The two-page fact sheets describe each project, its purpose and goals. They also describe benefits and applications, progress and milestones, and commercialization plan. Most fact sheets display a schematic or photo related to the project. For customers that want to learn more about a particular project, point-of-contact data are provided.

Impacts—Summary of OIT Program Results

As a result of OIT's efforts, more than 100 commercially successful technologies have been developed and deployed, with significant impacts on the U.S. economy and environment. This report summarizes some of the benefits—energy savings, waste reduction, increased productivity, lowered carbon dioxide and air pollutant emissions, and improved product quality—which have been tracked through periodic interviews with industrial technology suppliers and users. The report also provides brief descriptions of over 100 additional OIT-sponsored technologies that are expected to be commercialized within the next year or two.

Building Industry Partnerships: The Industries of the Future Model for Success

This new publication discusses the history and objectives of the IOF strategy, the steps involved in the IOF process, and examples of broad industry goals as well as specific projects resulting from this process. *Building Industry Partnerships* also provides a lengthy list of Federal, State and industry resources for OIT customers.

Office of Industrial Technologies Strategic Plan—A Work in Progress

This document outlines OIT's strategy for achieving increased energy efficiency and productivity, while limiting environmental impacts. The document describes OIT's role, situation and plans for the future. OIT's strategy, discussed in detail, calls for continued focus on energy- and waste-intensive industries, partnerships with these industries, and leveraging of industry and government resources. Other goals include facilitating the States "Industries of the Future" process and designing flexible and responsive programs.

Coming Soon! Updated OIT *Information Resources Catalog*

We are currently updating OIT's *Information Resources Catalog* to include descriptions of all the new items available at Expo. The on-line version of the catalog is currently available at www.oit.doe.gov/catalog/ and will be updated soon. We plan to publish in hard copy the revised catalog later this spring.

Now on CDROM: OIT Technical Reports for 1998

For the first time, the full text of technical reports resulting from OIT-supported RD&D projects for a full year have been compiled onto a single CDROM. Titled "Technical Reports from the Office of Industrial Technologies— 1998," copies can be obtained from OIT's Resource Room or DOE's Office of Scientific and Technical Information at 423-576-8401. Use order number DOE/EE 99001361-CD.

Now on Video: *Office of Industrial Technologies— Turning Industry Visions Into Reality*

OIT partners with industry to develop and deploy technology that promotes energy efficiency and competitiveness, and reduces pollution and waste. OIT's new fifteen minute video describes the organization's innovative "Industries of the Future" strategy, and how it works with industry. It features industry leaders and Federal officials describing their experiences with the program. It also includes information on technical and financial assistance programs offered by OIT.

Now on the Web: *The OIT Times*

The OIT Times, OIT's quarterly newsletter, is now available on OIT's Web site at www.oit.doe.gov/oittimes. Current and back issues are available in HTML and PDF formats. For customers who prefer the printed version of the newsletter, there is a registration form on OIT's site that will allow them to sign up to receive the newsletter by mail.

Calendar

- Adjustable Speed Drive Workshop*, Apr, Columbia, SC
- Adjustable Speed Drive Workshop*, Apr, Lafayette, IN
- Adjustable Speed Drive Workshop*, Apr, St. Louis, MO
- "Industries of the Future" Technology Access Program Presentation and MotorMaster+ Demo, Apr 19, Baltimore, MD
- Understanding Pump Systems/PSAT Workshop,* Apr 22-23, Lake Havasu, AZ
- Adjustable Speed Drive Workshop with ASDMaster and MotorMaster+ Demo, May 4, Chicago, IL
- Motor Systems Presentation and MotorMaster+ Demo, May 6, Chicago, IL
- Western Regional Resource Center for Innovation Conference, "Inventions for Economic Sustainability," May 13-15, Sun Valley, ID; contact Ann Rydalch at 208-526-1010
- Far West Regional Resource Center for Innovation Conference, "Industrial Excellence," May 17-18, Portland, OR; contact Nancy Moore at 509-372-4299
- Understanding Pump Systems/PSAT Workshop,* June 16, Milwaukee, WI
- Motor, Steam, and Compressed Air Challenge Program Presentation, Jun 17, Gainesville, FL
- Understanding Pump Systems/PSAT Workshop,* Jun 20, Chicago, IL
- Advanced Industrial Materials Annual Program Review, Jun 21-23, Pleasanton, CA; coincides with tour of Sandia National Lab
- Start up of Mercury 50 turbine engine, Aug, Rochelle, IL
- Understanding Pump Systems/PSAT Workshop,* Aug 29, San Diego, CA

***** Contact Anna Maksimova at 360-754-1097, ext. 100

Current/Upcoming Solicitations*

Area	Proposals Due
Agriculture	4/23/99
Mining (DOE Natl Labs only)	4/19/99
Mining industry	5/17/99
Chemical industry	7/99
Inventions & Innovation	7/19/99 (tentative)
NICE^3	9/1/99 (tentative)
Combustion	To be determined
Sensors & Controls	7/99 (tentative)

*See OIT's web site for further details

OIT's Web site redesigned to better serve customers

www.oit.doe.gov

OIT's Web site has received a makeover so that customers can most efficiently access the information they need. In addition to its new look, which appears throughout the site, OIT's Web site has also been designated a "select site" by Dow Jones Business Directory. Links to OIT's home page include:

Industries of the Future
This page connects customers to OIT's team sites, the States program page, solicitation information, and industry links, among others.

News
This page provides a glimpse of OIT's most recent headlines. It also offers access to other DOE press releases, and current and past issues of OIT's two newsletters, *The OIT Times* and *Energy Matters* (formerly *Turning Point*).

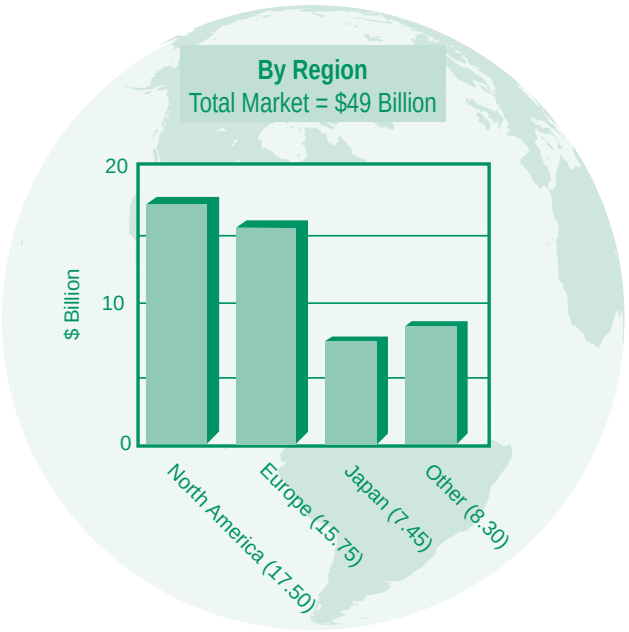
Technology Delivery
OIT's Technology Delivery page provides a coordinated portfolio of productivity enhancing products, services, and emerging technologies. This portfolio includes the Industries of the Future, Distributed Generation, Enabling Technologies, Technical Assistance and Financial Assistance programs. The page also includes information on resources and tools, and commercialized technologies.

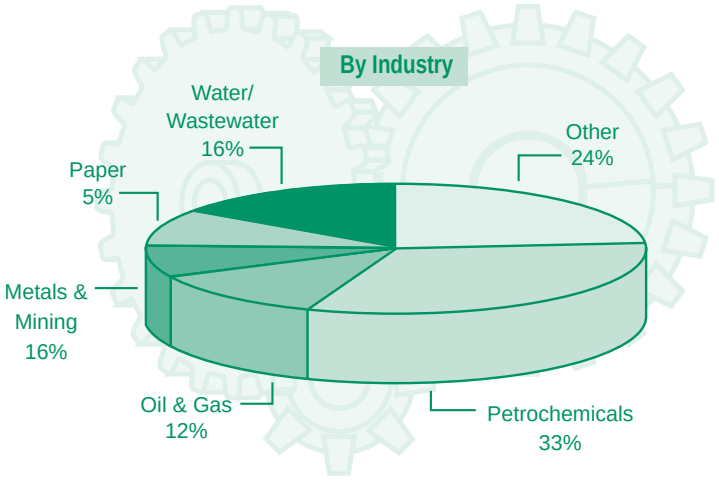
Tools
This OIT site offers access to several databases including the Industrial Projects Locator and Industrial Assessment Center Database. It also links customers to information on financial tools, software and publications.

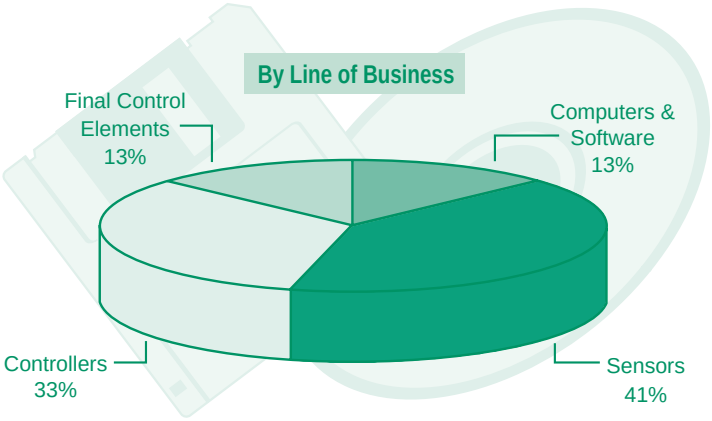
OIT Programs
This page lets you search for information on any of OITs programs. In addition, this site and several others offer access to information on international programs, OIT's budget, strategic plan and contacts.

Industry Trends

Estimated World Market for Process Controls, 2000







Source: The World Market for Process Controls, Find/SVP

Guest Editorial

Sensors and Controls: Enabling a "Smart and Automated" Future for U.S. Industry

By Eric Lightner,
Sensors & Controls Program Manager

OIT's crosscutting programs focus on RD&D of technologies and processes that can be applied to a broad cross-section of U.S. industries. One crosscutting program, Sensors and Controls (S&C), aims to provide industry with integrated measurement and control system solutions.

Many of the roadmaps developed by the Industries of the Future identify priority S&C needs, such as advanced sensor technology, improved information processing, and intelligent, open-architecture control systems. To address these needs, OIT's S&C program teams with and leverages resources from its industry-specific teams. A detailed description of the S&C program's strategy, priority technology needs, and its performance metrics is found in the *S&C Program Plan-August 1998*, available from the OIT Resource Center and on the Internet.

OIT is funding a number of projects as a result of these teaming efforts. In early FY 1999, a laser-based ultrasonics proposal was selected from a joint S&C/ steel industry solicitation. Additionally, five projects were awarded through the S&C Program FY 1999 solicitation covering R&D for in-situ melt composition measurements, thermal imaging, and intelligent process control with sensor fusion. The program also solicits proposals through two grant processes aimed at small businesses. These projects target near-term objectives such as improved sensors, information processing, and supervisory and communication systems.

The S&C program focus will eventually progress from component technologies to smart and automated, integrated control systems that improve industrial efficiency and productivity. Teamwork is the key to accomplishing these goals. We look forward to working with you to advance sensor and control technologies in energy-intensive industries.

(continued from page 1)

'Industries of the Future.' They've recently requested a briefing for their CEOs."

One of Expo's highlights took place at the conclusion of Reicher's speech, when–representing DOE–he signed renewed compacts with senior executives of the glass and steel industries. These compacts signify each partner's renewed commitment to the "Industries of the Future" process, and the continuing success of the public-private sector technology alliance.

"I believe in repeat business," said Paul Wilhelm, President of U.S. Steel, and Chairman of the American Iron and Steel Institute at the steel compact signing ceremony. "The best test of success is if the participants would do it again. We're all here because the first time was so successful," he said.

Representing the glass industry at its compact signing, Bruce Jennings–Chairman of the recently created Glass Manufacturing Industry Council, said, "We are optimistic that working together we will continue to see a significant acceleration in U.S. glass industry improvements and innovations for many years to come."

Congressional, industry representatives receive awards
Expo also featured two award sessions to help celebrate the success of the Industries of the Future partnerships. The first group of awards went to industry representatives while the second awards session recognized IOF Congressional champions. Representative George R. Nethercutt, Jr. (R-5th/WA) was a big winner, and was recognized by the National Wheat Growers Assoc., National Corn Growers Assoc. and the National Mining Assoc. In his remarks, Nethercutt said that OIT's Industries of the Future strategy "demonstrates that government and private sector resources are not mutually exclusive–they can go hand-in-hand for mutual benefit." OIT's industry partners nominated the awardees and sponsored both sessions. For a complete listing of all award winners, see page 9.

Expo's Tuesday luncheon featured three distinguished speakers:

- Dr. David Hardesty, President of West Virginia Univ.;
- The Honorable Simon A. Abingya, Deputy Minister for Mines and Energy in Ghana;
- Dr. Richard Chait of the National Research Council's National Materials Advisory Board.

Beside the plenary sessions and keynote addresses by lunchtime speakers, much of the work and discussion took place at "Customer/Supplier" and "Industry of the Future" breakout sessions. Highlights of all these sessions are described throughout this issue of the newsletter.

To sum up, Expo was of great value and utility to those able to attend. Many at the event said they were already looking forward to Expo IV in Spring, 2001.

THE OIT TIMES
"Turning Industry Visions into Reality"

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